

This page Is Inserted by IFW Operations  
And is not part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of  
The original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

### **IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
Please do not report the images to the  
Image Problem Mailbox.**

**THIS PAGE BLANK (USPTO)**

# (12) UK Patent Application (19) GB (11) 2 103 264 A

(21) Application No 8221980

(22) Date of filing 29 Jul 1982

(30) Priority data

(31) 1718/81

(32) 29 Jul 1981

(33) Ireland (IE)

(43) Application published  
16 Feb 1983

(51) INT CL<sup>3</sup>

E04C 5/18

(52) Domestic classification  
E1D 388 402 501 PC

(56) Documents cited

GB A 2080356

GB 1472389

GB 1236436

GB 1057593

GB 1003931

GB 0605503

(58) Field of search

E1D

(71) Applicant

Vivion James Glynn,

St Aubin,

Beechbrook,

Delgany,

County Wicklow,

Ireland

(72) Inventor

Vivion James Glynn

(74) Agents

Abel & Imray,

Northumberland House,

303—306, High Holborn,

London,

WC1V 7LH

(54) Beam spacer

(57) A building element for  
positioning and fixing rafters and the

like to wall plates, ridge boards and the like comprises a base plate (4) for attachment to a wall plate, ridge board or the like, with a plurality of fixing brackets (6) for engaging the rafters or joists. The brackets (6) comprise side members (7) and are formed by punching and bending the sheet metal of the base plate (4). Fixing holes (8, 10) are provided in the fixing brackets (6) and base plate (4) to accommodate nails (9) or other fixing members.

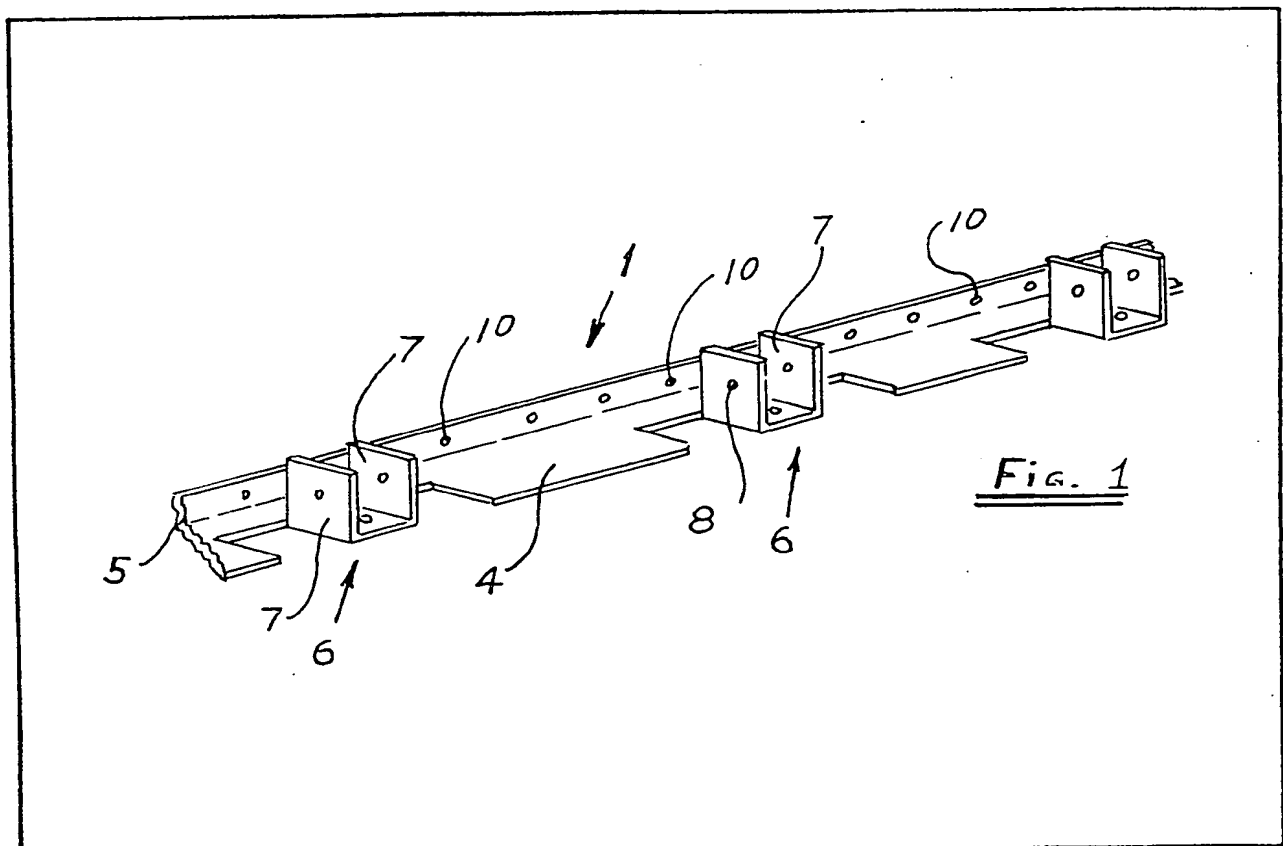


FIG. 1

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

2103264

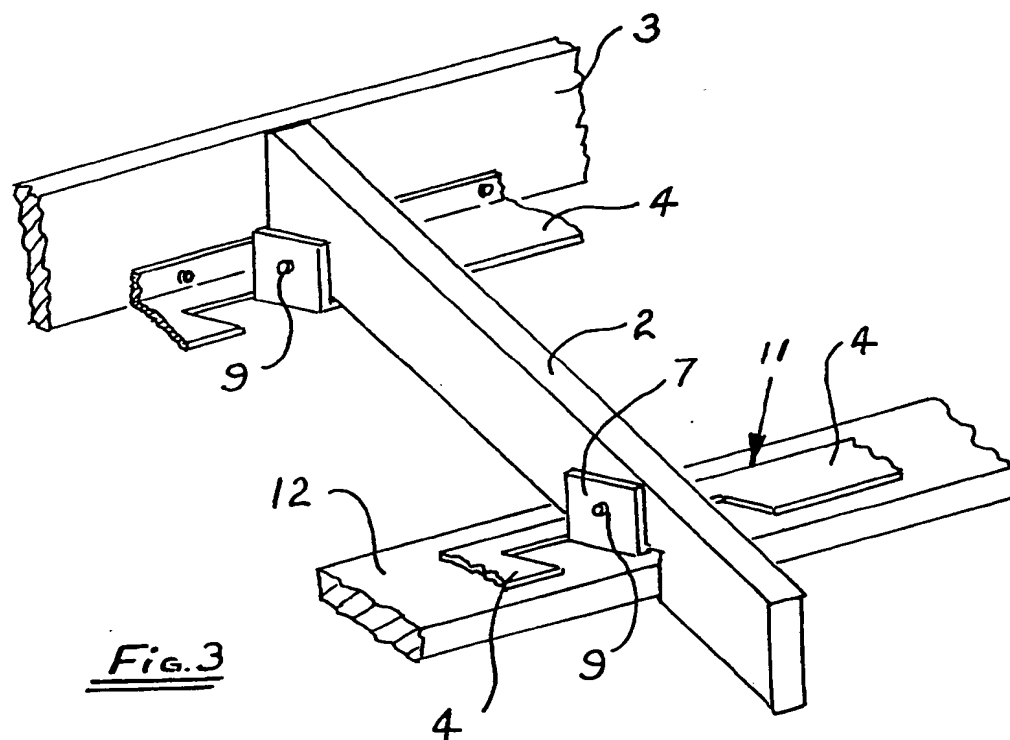
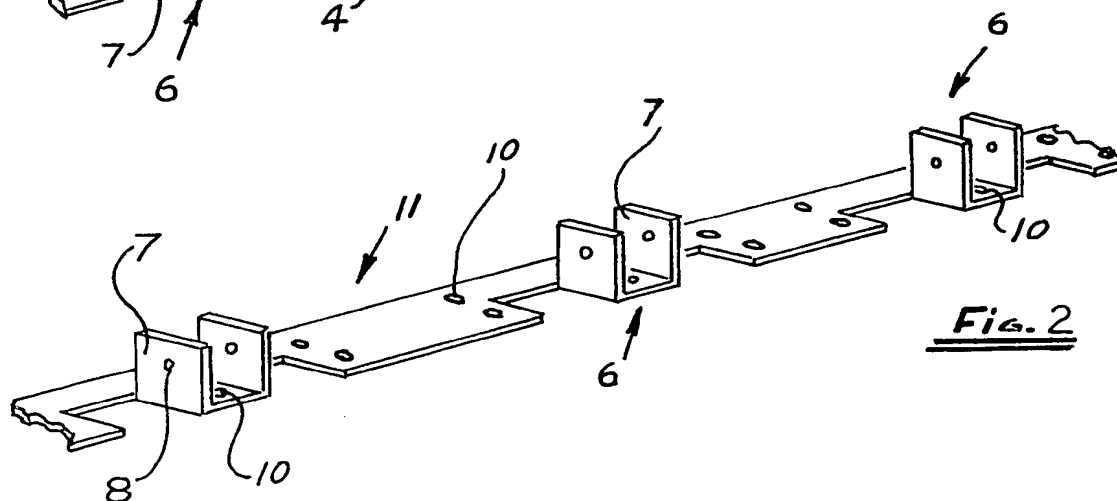
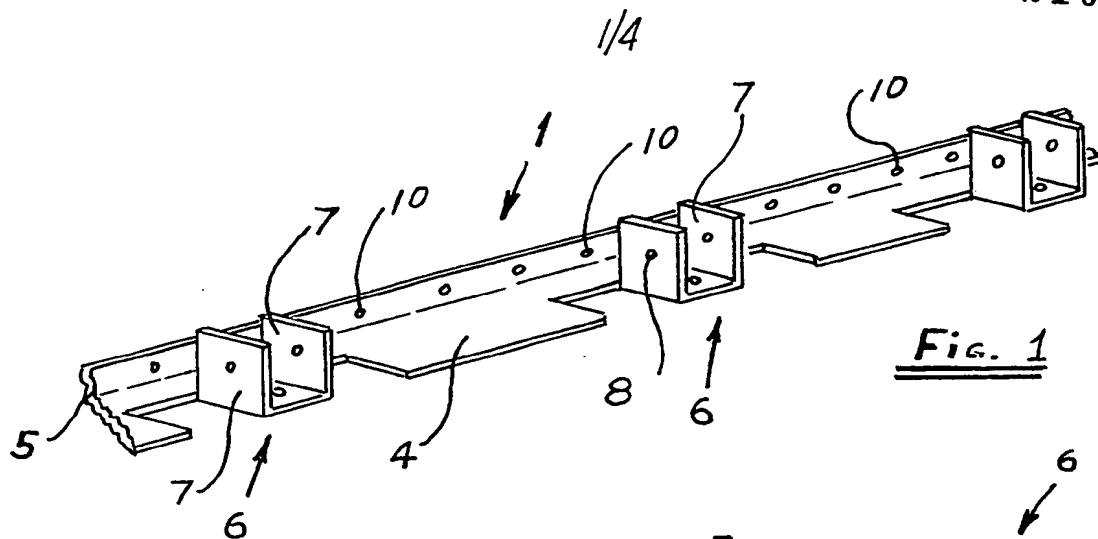


FIG. 4

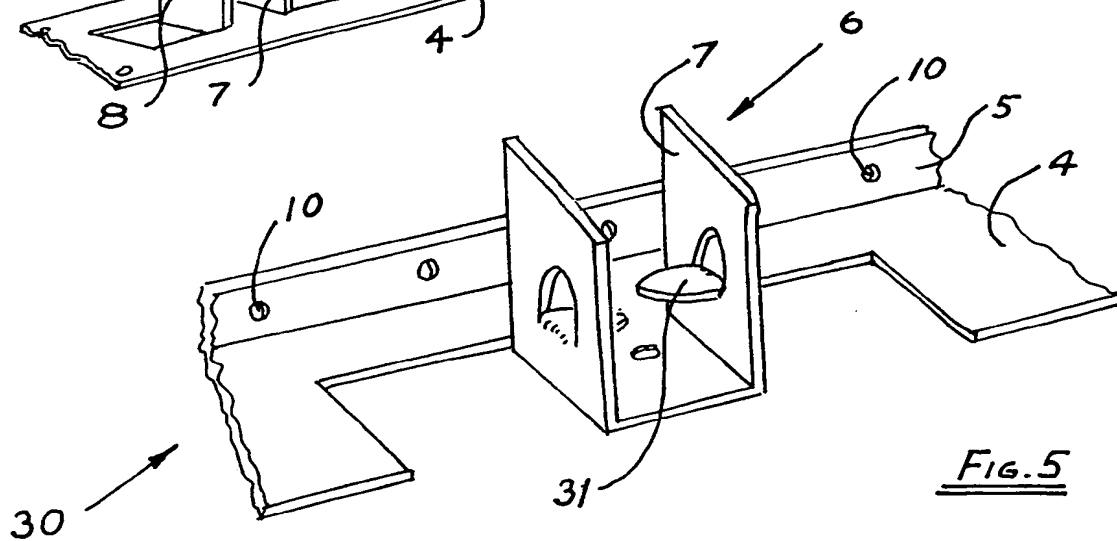
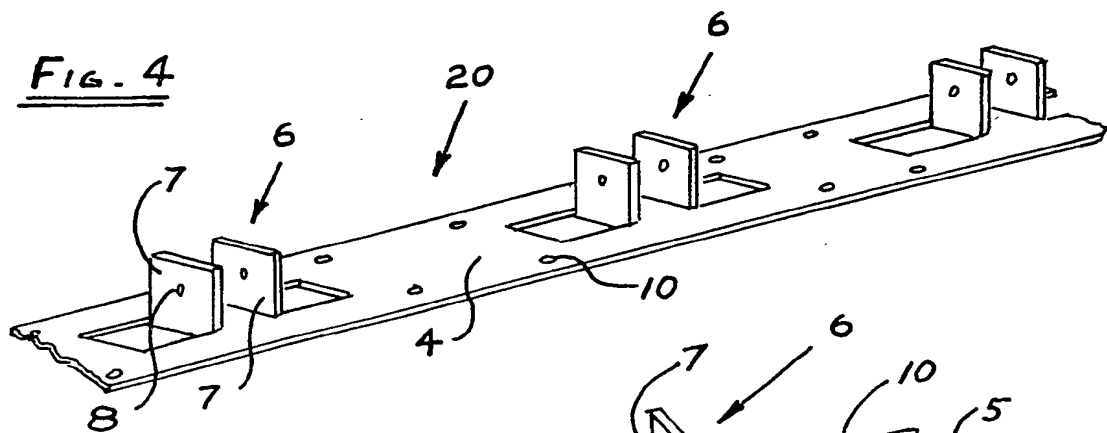


FIG. 5

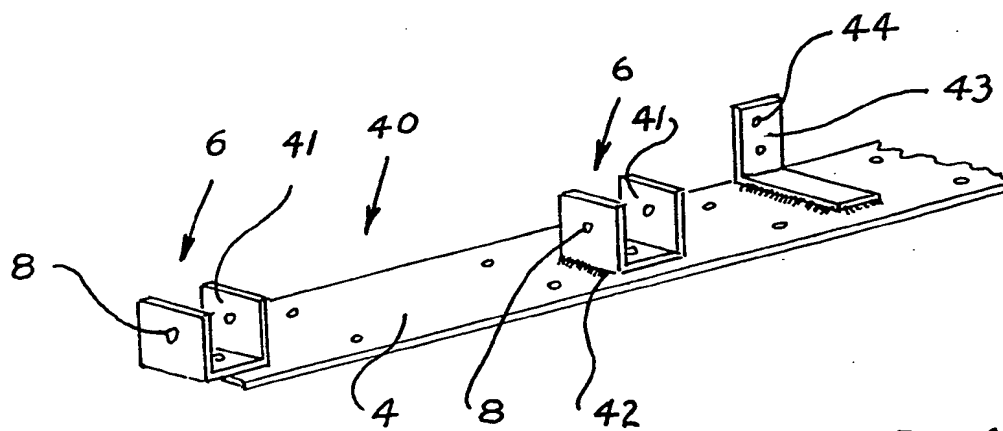
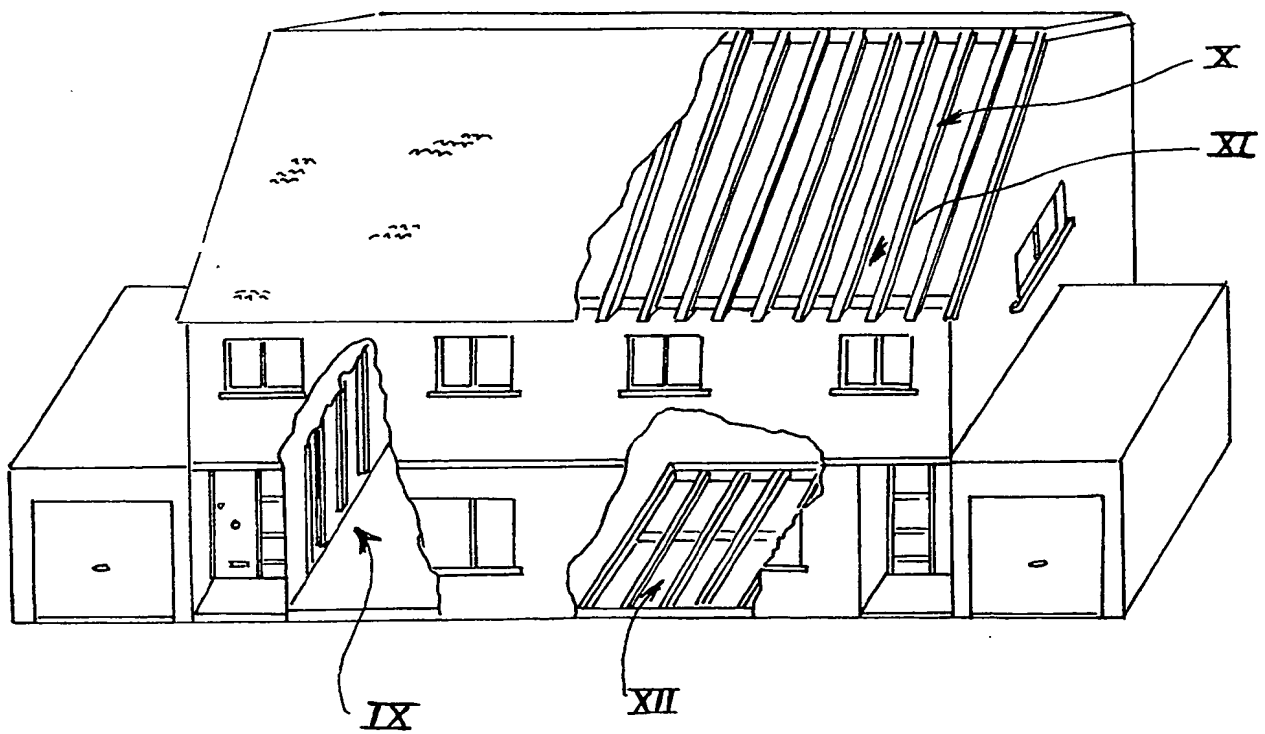
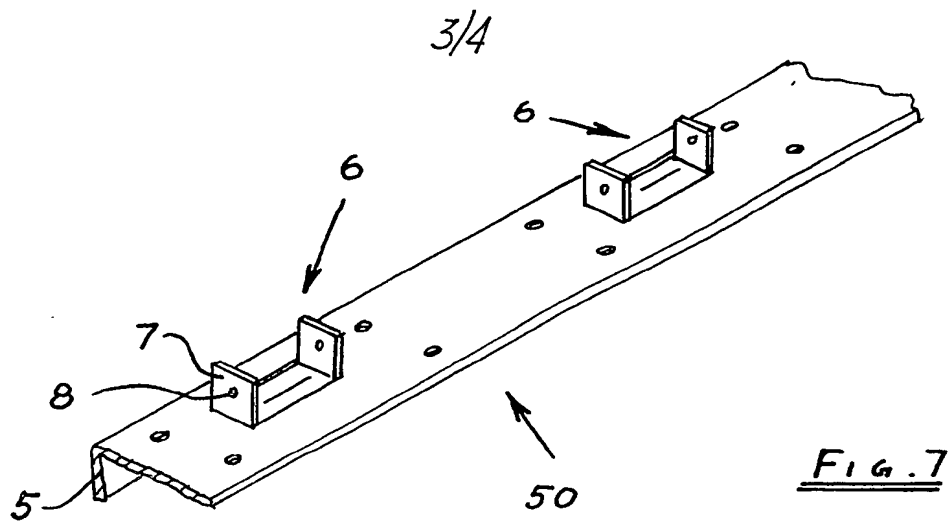
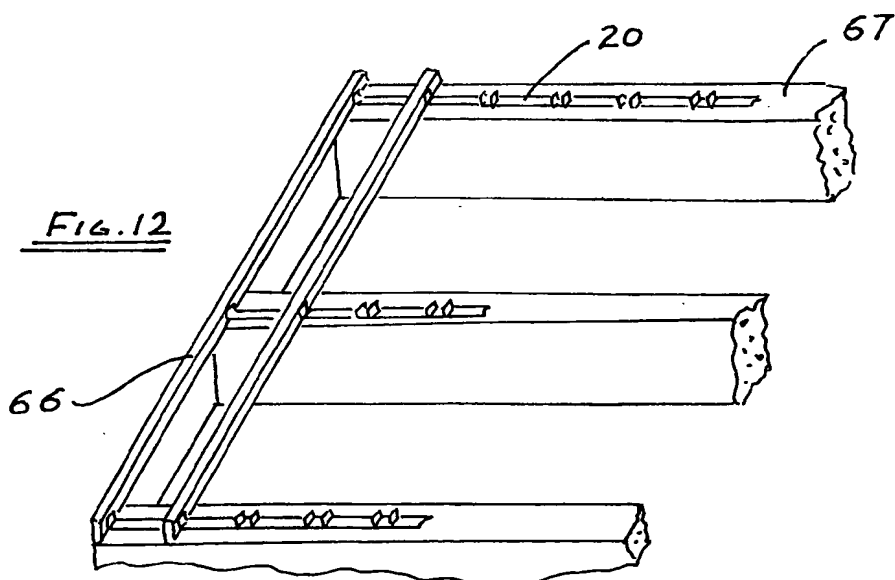
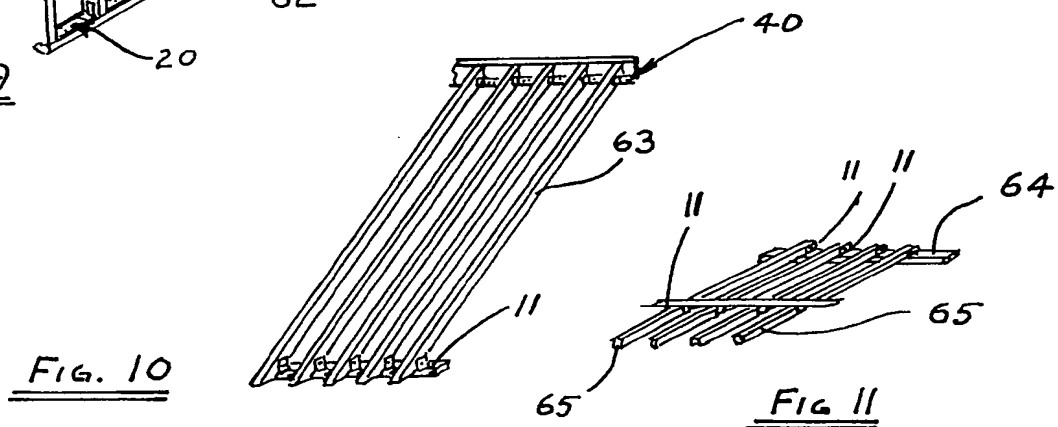
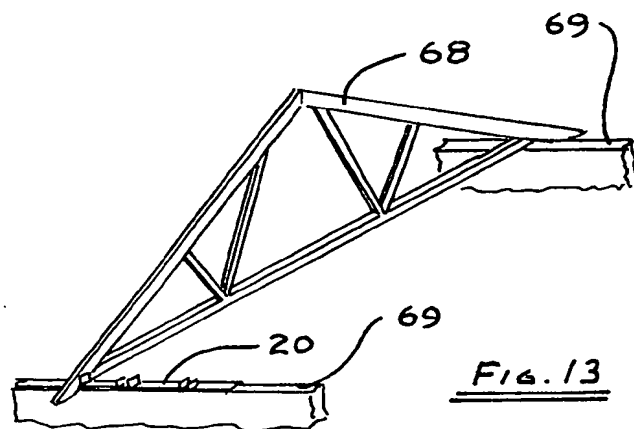
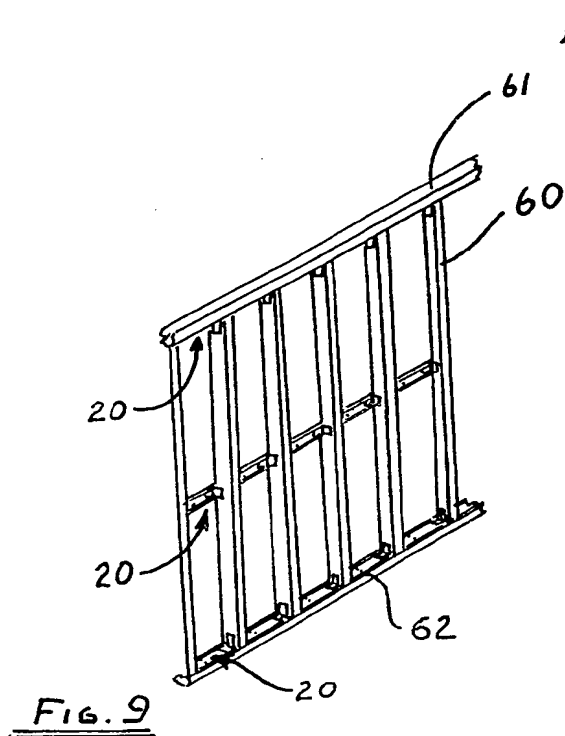


FIG. 6

2103264





## SPECIFICATION

### A building element

The present invention relates to a building element for positioning and fixing structural members in a building in particular, rafters, joists and the like to, for example, a ridge board or wall plate.

Timber is used extensively in the building industry in spite of the development of various man made materials. Timber has been found to be still the least expensive and most efficient material for making joists, roof trusses, rafters, supports for stud partitioning, floors and the like. All of these items use some form of beam or structural member manufactured from timber and they are placed in position by stapling, nailing or securing to a base. For example, rafters for a conventional pitched roof are placed in position by nailing to a ridge board and wall plate and often to additional bridge plates. Similarly, joists are used to form the support for floor boards, the joists being placed in position on the tressle walls. Similarly, vertical uprights of timber are used in the manufacture of stud partitions, the vertical uprights being fixed between head plates, sole plates and indeed the timber is further used to provide bridge plates intermediate the head and sole plates. Essentially, all these rafters, beams, trusses, supports or the like are manufactured from lengths of timber which are substantially rectangular in cross-section.

While timber is relatively cheap and inexpensive, it suffers from the disadvantage that the structural members and their supports must always be correctly marked out and accurately placed in position. Thus, for example, in constructing a pitched roof, considerable problems arise in ensuring that the roof trusses are accurately spaced apart and are secured in position.

Additionally, the roof trusses have to be held while being secured in position usually by face and side stitching. In addition to this being difficult to do, it is also difficult to place the nails in position without splitting the wood. However, a major portion of the time is spent in accurately positioning the roof timber, for securing down. Accordingly, the major problems is not in the actual fixing of such roof trusses but in putting them in the correct position before fixing them. Similar problems arise in laying joists, and in erecting stud partitioning.

There is therefore a need for a building element to overcome these problems. Hereinafter the term structural member is used to refer to trusses, rafters, joists and other such like structural members.

According to the invention there is provided a building element for positioning and fixing structural members, the element comprising an elongated base plate, and a plurality of longitudinally spaced-apart fixing brackets for engaging the structural members.

Preferably each fixing bracket is formed by a

pair of spaced-apart side members to embrace the structural member.

Advantageously, the base plate is of sheet material, the fixing brackets being integrally formed with the base plate by punching and bending portions of the sheet material.

In one embodiment of the invention the fixing bracket is a U-shaped member.

In another embodiment of the invention securing means are provided on the base plate to secure the building element to a member longitudinally disposed of the base plate, in one case, the securing means is provided by a bracket, and in another case it is provided by a plurality of holes in the base plate.

Preferably, the building element is of sheet metal material and is for use with timber structural members.

The invention will be more clearly understood from the following description of some preferred embodiments thereof given by way of example only with reference to the accompanying drawings in which:—

Fig. 1 is a perspective view of portion of a building element according to the invention,

Fig. 2 is a perspective view of portion of a building element according to another embodiment of the invention,

Fig. 3 is a perspective view of portion of a roof illustrating the building elements of Figs. 1 and 2 in use,

Fig. 4 is a perspective view of portion of a building element according to another embodiment of the invention,

Fig. 5 is a perspective view of portion of a building element according to a further embodiment of the invention,

Fig. 6 is a perspective view of portion of a building element according to a still further embodiment of the invention,

Fig. 7 is a perspective view of portion of a building element according to a still further embodiment of the invention,

Fig. 8 is a perspective cut-away view of a house showing portions of the house constructed using building elements according to the invention,

Fig. 9 is a detailed perspective view of portion of the house of Fig. 8 indicated by the arrow IX of Fig. 8,

Fig. 10 is a perspective view of another portion of housing indicated by the arrow X of Fig. 8,

Fig. 11 is a perspective view of a further portion of the house indicated by the arrow XI of Fig. 8,

Fig. 12 is a perspective view of a further portion of the house of Fig. 8 indicated by the arrow XII of Fig. 8, and

Fig. 13 is a perspective view of a roof truss in use with a building element according to the invention.

Referring to the drawings and initially to Figs. 1 to 3 thereof, there is illustrated building elements according to two embodiments of the invention for use in the construction of a roof of a house.



Fig. 1 illustrates a building element indicated generally by the reference numeral 1 for positioning and fixing rafters 2 to a ridge board 3 (see Fig. 3). The building element 1 comprises a base plate 4 of L-shaped cross-section formed from galvanized sheet metal material bent at 5. A plurality of structural member engaging fixing brackets 6, in this case rafter engaging fixing brackets 6 are formed by pairs of spaced-apart side members 7 which embrace the rafters 2. The side members 7 are formed by punching and bending the portions 7 from the sheet metal of the base plate 4. It can be seen that the brackets 6 are arranged transversely of the base plate 4. Fixing holes 8 are provided in the side members 7 to accommodate nails 9 for securing the fixing brackets 6 to the rafters 2. Securing means to secure the building element to the ridge board are provided by a plurality of fixing holes 10 to accommodate nails in the base plate 4. It will be appreciated that as well as enhancing the rigidity of the base plate, the bent part 5 also accommodates the holes 10 for use in securing the element 1 to the ridge board 3.

Fig. 2 illustrates a building element 11 for securing the rafters to a wall plate 12 (see Fig. 3). This building element 11 is substantially similar to that just described and similar components are identified by the same reference numerals. In this embodiment of the invention the bent portion 5 is omitted and fixing holes 10 are provided in the base plate 4 to secure the building element 1 to the wall plate 12. It can be seen from Fig. 2 that fixing holes 10 are also provided in the portion of the base plate between a pair of side members 7. This considerably enhances the strength of the joint made by the brackets 6, since what is effectively an integral portion with the side members 7 can be nailed to the wall plate 12.

To construct a roof using the building elements 1 and 11, the wall plates 12 and ridge boards are positioned. The building elements 1 and 11 are secured to the ridge board 3 and wall plate 12 respectively as illustrated in Fig. 3. The rafters 2 are positioned in the fixing brackets 6 of the building elements 1 and 11 and secured therein by nails 9 through the holes 8 in the brackets 6.

Referring now to Fig. 4 there is illustrated a building element according to another embodiment of the invention indicated generally by the reference numeral 20. This element is substantially similar to those just described and similar components are identified by the same reference numeral. In this embodiment of the invention, the side members 7 of the fixing brackets 6 are punched and bent out of the central portion of the base plate 4. Fastener holes 8 and 10 are provided in the side members and base plate respectively to accommodate nails or the like. This building element 20 is again manufactured from galvanized sheet metal. It would be suitable for securing rafters, joists or the like to wall plates, sole plates or the like.

Referring now to Fig. 5 there is illustrated a building element according to a further

embodiment of the invention indicated generally by the reference numeral 30. This building element is substantially similar to that described with reference to Fig. 1 and similar components identified by the same reference numeral. In this building element 30 barbs 31 project inwardly from the side members 7 to engage and secure a structural member, for example, a rafter. The barbs 31 are formed by punching and bending the sheet material of the side members 7.

In use, this building element is supplied with the side members 7 splayed outwardly to receive a structural member. The side members are then forced or driven inwards by means of a hammer or other suitable tool so that the barbs 31 engage the structural member.

Fig. 6 illustrates a building element 40 according to a further embodiment of the invention and again, components similar to those described previously are identified by the same reference numeral. In this embodiment of the invention the base plate 4 is formed from an elongated bar of steel material. The fixing brackets 6 are formed by U-shaped members 41 welded to the base plate 4 at 42. Securing means to secure the element 40 to a ridge board are provided by L-shaped brackets 43 spot welded to the base plate 4. Fixing holes 44 accommodate nails. This building element is particularly suitable for securing rafters to a ridge board. The building element 40 is secured to the ridge board by nails through the fixing holes 44 and the rafters are then fixed in the fixing brackets 6 by nails through the holes 8.

It should be noted in this embodiment of the invention that the base plate 4 terminates halfway between the endmost bracket 6 on the left-hand side of the building element. This makes it possible to overlap the base plate 4 of each building element 40 with an adjacent element. This improves the accuracy with which the building elements according to this embodiment of the invention may be laid.

Referring now to Fig. 7 there is illustrated a building element 50 according to a still further embodiment of the invention. Again, similar components to those just described are identified by the same reference numeral. The building element 50 has a base plate 4 of galvanized sheet metal of L-shape cross-section. The bent portion 5 is bent downwardly.

This member would be particularly suitable for mounting on a wall plate of a building. The bent portion 5 could abut a side face of the wall plate. The fixing brackets 6 are formed by punching and bending the sheet metal of the base plate 4. In this embodiment of the invention the side members 7 are formed by bending the punch portions upwards and away from each other, while in previous embodiments of the invention they have been formed by bending the punched portions upwards and towards each other. This arrangement lends additional strength to the brackets 6.

Figs. 8 to 12 illustrate a number of uses to

which the building elements according to the invention may be put. It will of course be appreciated that these are by no means exhaustive and are merely given by way of

5 example. Fig. 8 illustrates a house showing the various areas where the building elements may be used. In Fig. 9 it can be seen that the building element is used for positioning and fixing uprights 60 of a stud partition framework to the head plate 61 and sole plate 62. In this embodiment of the invention the building element 20 illustrated in Fig. 4 is mounted on the head and sole plates and uprights 60 are fixed in the fixing brackets 6. An intermediate building element 20 is also used halfway between the sole and head plates to ensure accurate spacing of the upright 60.

Fig. 10 illustrates the building elements 40 and 11 or Figs. 6 and 2 in use with the rafters 63 of the building. Fig. 11 illustrates how the ceiling joists 65 may also be mounted on the wall plate 64 with the building element 11 of Fig. 2. A building element 10 is also used intermediate the wall plates 64 to retain the joists 62 accurately spaced apart. Fig. 12 illustrates how three building elements 20 are used to position and fix floor joists 66 to tossle walls 67. Fig. 13 illustrates how a roof truss 68 is mounted to wall plates 69 using building elements 20.

It will readily be appreciated that the building element according to the present invention have two principal advantages. Firstly, it facilitates the actual fixing of the various structural members into their correct position allowing nails or the like to be correctly positioned and driven into place and furthermore it will give added rigidity to the fixing, and avoids splitting of the timber by nails. Secondly, and perhaps the principal advantage of the invention is that it allows accurate positioning and fixing of the structural member to be carried out without the necessity for elaborate measuring and clamping. All that is required is that the structural members, be they rafters, joists or the like, be placed in the fixing brackets and then secured by a suitable fastening means.

It will be appreciated that while the building elements described with reference to the drawings are of metal or steel they could be of any suitable materials, for example, stainless steel or other suitable metal or alloy. Indeed, it is envisaged in certain cases they could be manufactured from a plastics material. Needless to say, it will be appreciated that it is not necessary to have the steel galvanized although this is preferable as it avoids corrosion.

It will be appreciated that while the side members of the fixing brackets have been described as being formed by punching portion of the base plate, this is not necessary. Neither, is it necessary for the fixing members to be of U-shape construction as illustrated with reference to Fig. 6 of the examples. In this case, the side members could have been formed by two side members welded directly to the base plate.

Indeed, it will be appreciated, that where the side members of the fixing brackets are punched

from the base plate, many other suitable methods besides those described could be used for forming the side members.

It is also envisaged that in certain cases where it is desired that the structural members should be connected to the base member at an angle other than 90° the side members of the fixing brackets may be arranged at the appropriate angle.

It will also be appreciated that while the fixing brackets have been described as being formed by side members of particular shape, any other suitable shape or size of side member could be used.

It will also be appreciated that means other than those described for securing the fixing brackets and base plate to the various structural members could be used.

While the invention has been described for use with timber structural members, it is envisaged that it could be used in connection with other structural members, for example, structural members of steel, plastics material or other such members.

It is further envisaged that the building element 1 of Fig. 1, instead of being mounted to the ridge board by the bent portion 5, could be mounted by nailing the base plate flat to the side face of the ridge board. The bent portion 5 would project outwardly from the ridge board to support the rafter while it was being nailed.

### Claims

1. A building element for positioning and fixing structural members, the element comprising an elongated base plate, and a plurality of longitudinally spaced-apart fixing brackets for engaging the structural members.

2. A building element as claimed in claim 1 in which each fixing bracket is formed by a pair of spaced-apart side members to embrace the structural member.

3. A building element as claimed in claim 1 or 2 in which the base plate is of sheet material, the fixing brackets being integrally formed with the base plate by punching and bending portions of the sheet material.

4. A building element as claimed in any preceding claim in which the fixing bracket is a U-shaped member.

5. A building element as claimed in any preceding claim in which the fixing brackets are arranged to receive the structural members transversally of the base plate.

6. A building element as claimed in any preceding claim in which fixing holes are provided in the fixing brackets to accommodate nails for securing the structural members.

7. A building element as claimed in any of claims 1 to 5 in which barbs are provided on the fixing brackets to engage the structural members.

8. A building element as claimed in any preceding claim in which the base plate is of L-shape cross-section.

9. A building element as claimed in any preceding claim in which securing means are

provided on the base plate for securing the building element to a member longitudinally disposed of the base plate.

- 5 10. A building element as claimed in claim 9 in which the securing means are provided by securing brackets.

- 10 11. A building element as claimed in claim 9 in which the securing means are provided by fastener engaging fixing holes provided in the base plate.

12. A building element as claimed in any preceding claim in which the building element is manufactured from sheet metal material.

- 15 13. A building element as claimed in any preceding claim in which the fixing brackets are adapted to receive structural members of timber.

14. A building element as claimed in claim 13

in which the structural members are rafters and the securing means is adapted for securing the building element to a ridge board or a wall plate.

- 20 15. A building elements as claimed in claim 13 in which the structural members are joists and the securing means for securing to a tossle wall is adapted to secure the building element to a sole plate.

- 25 16. A building element as claimed in claim 13 in which the structural members are vertical members for stud partitioning and the securing means is adapted for securing the building element to a sole plate or head plate.

- 30 17. A building element substantially as described with reference to and as illustrated in the accompanying drawings.

**THIS PAGE BLANK (USPTO)**